

# PATENT ABSTRACTS OF JAPAN

(11) Publication number : 10-256346

(43) Date of publication of application : 25.09.1998

(51) Int.CI.

H01L 21/68  
B65G 49/07

(21) Application number : 09-078914

(71) Applicant : TOKYO ELECTRON LTD

(22) Date of filing : 13.03.1997

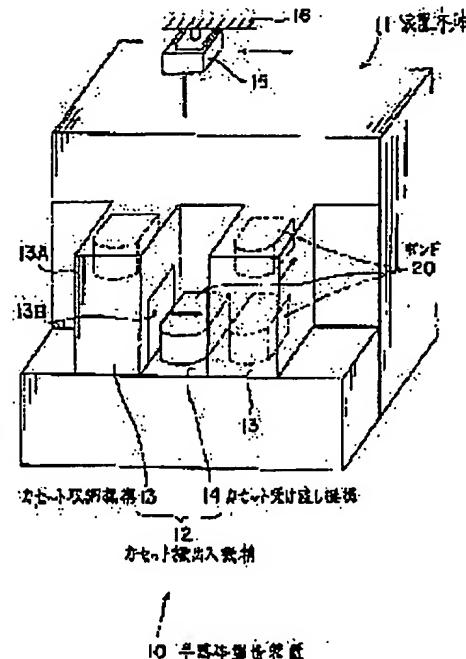
(72) Inventor : IIZUKA YOJI  
ASAOKAWA TERUO

## (54) CASSETTE TRANSFERRING MECHANISM AND SEMICONDUCTOR MANUFACTURING APPARATUS

### (57) Abstract:

PROBLEM TO BE SOLVED: To reduce the footprint and elevate the availability by placing a cassette housing mechanism for stacking cassette inside at a work entrance and a cassette transfer mechanism at the side thereof.

SOLUTION: A semiconductor manufacturing apparatus 10 for treating works as specified has a work entrance, cassette housing mechanism 13 for stacking cassettes 20 inside is disposed at this entrance and a transfer mechanism 14 for transferring the cassettes 20 with the housing mechanism 13 is disposed at the side of the mechanism 13 or e.g. between a pair of right and left cassette housing mechanism 13 housed in cassette housing chambers 13A having openings facing the side face of the transfer mechanism 14 with doors 13B for opening the openings when loading/unloading the cassettes 20.



### LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

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CLAIMS

## [Claim(s)]

[Claim 1] The cassette taking-out close device characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[Claim 2] The above-mentioned cassette delivery device is a cassette taking-out close device according to claim 1 characterized by having the cassette installation object in which forward/backward moving is possible for the above-mentioned cassette to the above-mentioned cassette receipt device.

[Claim 3] The cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, It has the cassette delivery device in which a cassette is delivered between this cassette receipt device. The above-mentioned cassette delivery device The cassette taking-out close device characterized by having been horizontally installed from the above-mentioned taking-out inlet port, the revolving shaft set up by one side between the above-mentioned cassette receipt devices, and this revolving shaft, and having the cassette installation object in which forward inverse rotation is possible through this revolving shaft.

[Claim 4] the above-mentioned cassette receipt device -- the above-mentioned cassette -- laying -- and rise and fall -- a cassette taking-out close device given in any 1 term of claim 1 characterized by having two or more controllable cassette installation objects - claim 3.

[Claim 5] it crosses and connects with vertical two or more stages at a level with the shaft which is the cassette taking-out close device which carries out taking-out close [ of the cassette ] to a processed object to the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing, and was set up by the side of the above-mentioned taking-out close device, and this shaft -- having -- respectively -- becoming independent -- forward hard flow -- pivotable -- and a shaft -- following -- one ---like -- rise and fall -- the cassette taking-out close device characterized by to have two or more controllable cassette installation objects.

[Claim 6] In semiconductor fabrication machines and equipment equipped with the cassette taking-out close device which carries out taking-out close [ of the cassette by which two or more processed objects were contained to the body of equipment ] the above-mentioned cassette taking-out close device Semiconductor fabrication machines and equipment characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[Claim 7] The above-mentioned cassette taking-out close devices are semiconductor fabrication machines and equipment according to claim 6 characterized by unifying the above-mentioned cassette receipt device and the above-mentioned cassette delivery device.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention relates to semiconductor fabrication machines and equipment equipped with a cassette taking-out close device and this cassette taking-out close device.

#### [0002]

[Description of the Prior Art] The inclination which shifts to a 12 inches wafer at a stretch from a current semiconductor wafer (6 inches or 8 inches) (it calls the following and "being only a wafer".) has processing of the wafer in a semi-conductor production process. In connection with this, a carrying-out [ semiconductor fabrication machines and equipment ]-12 inch wafer correspondence thing is being developed. Since, as for the time of a 12 inch wafer, diameter [ of macrostomia ]-izing and the line breadth of the integrated circuit it not only weight-izes, but formed in a wafer only become [ a wafer ] the hyperfine structure below a subquarter micron, in each semi-conductor plant, the super-defecation technique of a clean room and the automatic conveyance-ized technique of a wafer become still more important. And since the footprint of various kinds of semiconductor fabrication machines and equipment increases, it becomes still more important to also control footprint increase of the circumference of semiconductor fabrication machines and equipment.

[0003] By the way, it was common to have leveled a wafer, when it conveyed a cassette where a wafer is stood when a 8 inches wafer conveys a wafer between each process, and it performed the taking-out close over the semiconductor fabrication machines and equipment of each process. The taking-out close into the equipment of a cassette is performed through an operator, or it is performing it through AGV. However, since the lower limit section of a wafer may be damaged in a self-weight, the vibration at the time of conveyance, etc. when it conveys standing a wafer in the case of a 12 inch wafer, where a wafer is leveled, a cassette is conveyed, and when performing the taking-out close over the semiconductor fabrication machines and equipment of each process, it is coming to carry out in the level condition as it is. And since it becomes difficult to perform the taking-out close into the equipment of a cassette through an operator from the weight and the cure against particle of a wafer, automation of these activities is promoted.

[0004] Moreover, after a 8 inch wafer made the cassette receipt room in which the cassette was laid a predetermined degree of vacuum, he was trying to transfer one wafer at a time to a predetermined processing room via a load lock chamber. However, while great time amount will be needed by the time it makes a cassette receipt room into a vacua since cassette capacity will become large if it becomes a 12 inch wafer, organic gas etc. may be emitted by vacuum suction as impurity gas from the cassette made from plastics, and the inside of equipment may be polluted. Therefore, in the case of the manufacturing installation corresponding to 12 inches, once arranging a junction room in the preceding paragraph of a load lock chamber and taking out the wafer in a cassette to the junction interior of a room, it comes to convey one wafer at a time to each processing room through a load lock chamber. Therefore, the thing corresponding to a 12 inch wafer also in the gestalt of a cassette is required. The pod (for example, uni-FAIDO pod) of the sealing method which now roughly divides as a cassette, for example, contains the cassette of an opening method and a cassette in a pod, and covers is considered.

[0005] By the way, it is constituted as shown in drawing 8 as the semiconductor fabrication machines and equipment of the present 12 inch correspondence under the above situations, especially its front end. These semiconductor fabrication machines and equipment 1 are equipped with the tray 2 which carries out taking-out close [ of 13 sheets or the pod P contained 25 sheets ] for a wafer to a cassette receipt room, the opener 3 which open and close the lid of the pod P on this tray 2, and the junction room 4 which takes out two or more wafers from the inside of the pod P wide opened by this opener 3 collectively. Moreover, although not illustrated, a load lock chamber is connected to the junction room 4 through a gate valve, and it has transferred one wafer in the junction room 4 at a time to the processing room of a wafer.

Moreover, the front panel 5 is established in the front face of equipment, and the equipment and clean room side is divided by this front panel 5. The door 6 opened and closed in case it carries out taking-out close [ of the pod P ] to a cassette receipt room through a tray 2 is formed in this front panel 5.

[0006]

[Problem(s) to be Solved by the Invention] however, in the case of the front end of the conventional semiconductor fabrication machines and equipment When carrying out taking-out close [ of the pod P ] to the cassette receipt room of semiconductor fabrication machines and equipment, in order to perform the taking-out close of Pod P through the tray 2 pulled out outside from the front panel 5, The exclusive tooth space for pulling out a tray 2 was needed, the footprint of semiconductor fabrication machines and equipment increased so much, and the technical problem that so excessive a tooth space was needed for the bay area formed by the equipment group of the same model occurred. Moreover, since only one piece carried out taking-out close [ of the pod P ] at a time through a tray 2 in the case of the conventional cassette receipt room, the technical problem that the processing cycle of a wafer is short, the count of taking-out close of Pod P increased, and the operation effectiveness of equipment itself was low occurred.

[0007] It aims at offering the cassette taking-out close device and semiconductor fabrication machines and equipment which can raise operation effectiveness while this invention was made in order to solve the above-mentioned technical problem, and it can reduce footprints.

[0008]

[Means for Solving the Problem] The cassette taking-out close device of this invention according to claim 1 is characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[0009] Moreover, the cassette taking-out close device of this invention according to claim 2 is characterized by equipping the above-mentioned cassette delivery device with the cassette installation object in which forward/backward moving is possible for the above-mentioned cassette to the above-mentioned cassette receipt device in invention according to claim 1.

[0010] Moreover, the cassette taking-out close device of this invention according to claim 3 The cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, It has the cassette delivery device in which a cassette is delivered between this cassette receipt device. The above-mentioned cassette delivery device It is characterized by having been horizontally installed from the above-mentioned taking-out inlet port, the revolving shaft set up by one side between the above-mentioned cassette receipt devices, and this revolving shaft, and having the cassette installation object in which forward inverse rotation is possible through this revolving shaft.

[0011] moreover, the cassette taking-out close device of this invention according to claim 4 -- invention given in any 1 term of claim 1 - claim 3 -- setting -- the above-mentioned cassette receipt device -- the above-mentioned cassette -- laying -- and rise and fall -- it is characterized by having two or more controllable cassette installation objects.

[0012] Moreover, the cassette taking-out close device of this invention according to claim 5 The shaft which is the cassette taking-out close device which carries out taking-out close [ of the cassette ] to a processed object to the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing, and was set up by the side of the above-mentioned taking-out close device, it crosses and connects with vertical two or more stages at a level with this shaft -- having -- respectively -- becoming independent -- forward hard flow -- pivotable -- and a shaft -- following -- one ---like -- rise and fall -- it is characterized by having two or more controllable cassette installation objects.

[0013] Moreover, the semiconductor fabrication machines and equipment of this invention according to claim 6 In semiconductor fabrication machines and equipment equipped with the cassette taking-out close device which carries out taking-out close [ of the cassette by which two or more processed objects were contained to the body of equipment ] the above-mentioned cassette taking-out close device It is characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[0014] Moreover, the semiconductor fabrication machines and equipment of this invention according to claim 7 are characterized by the above-mentioned cassette taking-out close device unifying the above-mentioned cassette receipt device and the above-mentioned cassette delivery device in invention according to claim 6.

[0015]

[Embodiment of the Invention] Hereafter, this invention is explained based on the operation gestalt shown in drawing 1 - drawing 7. The semiconductor fabrication machines and equipment 10 of this operation gestalt are equipped with the body 11 of equipment with which two or more processing rooms have been arranged in the shape of a cluster around a transfer room, and the cassette taking-out close device 12 which is arranged in the front face of this body 11 of equipment, and carries out taking-out close [ of the wafer ] per cassette as shown in drawing 1 - drawing 3. The cassette 20 which carries out taking-out close consists of cassette taking-out close devices 12 as a pod of the direct vent system formed with the synthetic resin with which a 12 inches wafer contains 13 sheets or 25-sheet receipt, such as a polycarbonate and PEEK (polyether ether ketone). Moreover, nitrogen gas is enclosed in a pod 20, and the interior is made into the clean environment while preventing the natural oxidation of a wafer as much as possible. So, below, a cassette 20 is explained as a pod 20.

[0016] Moreover, the cassette receipt device 13 of a Uichi Hidari pair which the above-mentioned cassette taking-out close device 12 is arranged at the taking-out inlet port of the wafer of the body 11 of equipment, and contains the pod 20 of plurality (for example, two pieces) in the vertical direction, It has the cassette delivery device 14 in which it is arranged between each cassette receipt device 13, and a pod 20 is delivered between the cassette receipt devices 13, and it is constituted so that drive control may be carried out according to a predetermined program. And it is contained in cassette receipt room 13A, respectively, opening which a pod 20 passes, respectively is formed in the side face by the side of the cassette delivery device 14 of each cassette receipt room 13A, and each cassette receipt device 13 has opened at the time of taking-out close [ of a pod 20 ] and closed door 13B of this opening.

[0017] Moreover, as shown in drawing 1 and drawing 3, the cassette transport device 15 is arranged above the cassette delivery device 14, while this cassette transport device 15 moves between the bay areas of various kinds of semiconductor-fabrication-machines-and-equipment groups according to the rail 16 arranged by head lining of a clean room, it moves in the inside of a bay area, and the pod 20 is directly delivered between each cassette delivery device 14 of two or more semiconductor fabrication machines and equipment 10. Therefore, the cassette transport device 15 has grasping section 15A which descends from head lining through a wire etc. and grasps a pod 20, and has grasped the grasped section 22 formed in body 21 top face of a pod 20. Therefore, with this operation gestalt, the cassette transport device 15 has been made to perform all conveyances of a pod 20.

[0018] Moreover, as shown in drawing 4, in the inner part of the above-mentioned cassette receipt room 13A, the junction room 17 is arranged through a clearance, and the load lock chamber 18 (refer to drawing 4) is connected with this junction room 17 through the gate valve. In this junction room 17, the handling arm (not shown) of a multi-joint mold is arranged, and while packing a wafer two or more sheets (for example, 13 sheets or 25 sheets) every and conveying it between a pod 20 and the junction room 17 through this handling arm, two or more wafers are horizontally held in the junction room 17. Moreover, a clearance is formed between cassette receipt room 13A and the junction room 17, and the opener 19 which opens and closes the lid 23 of a pod 20 is arranged in this clearance. As shown in drawing 5 R>5, when conveying Wafer W through a handling arm, the lid 23 of a pod 20 is opened [ this opener 19 ] and closed automatically in the wafer taking-out close location to the body 11 of equipment. Furthermore, the above-mentioned clearance is intercepted from cassette receipt room 13A and the outside, as the arrow head of drawing 4 shows, it supplies the air defecated by this clearance through the filter by downward flow, and it is changing the clearance into the always pure condition while it prevents a wafer from particle adhesion, even if it opens the lid 23 of a pod 20 wide with an opener 19. Furthermore, when it is attached in the opener 19 of the junction room 17, and the field which counters a gate valve (not shown) and carries out taking-out close [ of the wafer ], after opening a gate valve wide and carrying in a wafer, a gate valve is closed and the junction room 17 is sealed. therefore, the handling arm after opening the lid 23 of a pod 20 wide with an opener 19 -- minding -- a pod 20 to a wafer -- the inside of the junction room 17 -- carrying in -- holding -- this condition -- a wafer -- every one sheet -- taking out -- a funnel -- it conveys to various kinds of processing rooms through a lock chamber 19, and has been made to perform for example, etching processing, membrane formation processing, etc. in each processing interior of a room.

[0019] By the way, the above-mentioned cassette receipt device 13 is equipped with cassette installation object 13C of two steps of upper and lower sides, and the rise-and-fall controlling mechanism (not shown) which carries out rise-and-fall control of these cassette installation object 13C in one as shown in drawing 3 and drawing 4, and it is made to have stopped each cassette installation object 13C according to the rise-and-fall controlling mechanism in the wafer taking-out close location. Furthermore, the cassette positioning device which is not illustrated is prepared in cassette installation object 13C, a pod 20 is positioned on cassette installation object 13C according to this positioning device, and it enables it to have opened and closed that lid 23. There is a thing constituted by having the crevice formed in the top face of cassette installation object 13C at the rear face of a pod 20 as this positioning device corresponding to the

projections by which two or more formation was carried out, and these projections, for example, or a thing which made the projection and the crevice reverse, respectively. Moreover, cassette installation object 13C is constituted possible [ forward/backward moving ] to the direction of an opener 19, and when it stops through a rise-and-fall drive in a wafer taking-out close location, it is made to have advanced to the opener 19 side. Therefore, continuous running can be performed by the cassette receipt device 13, without being able to carry out taking-out close [ of other one pod 20 ], and stopping semiconductor fabrication machines and equipment 10, while being able to contain two pods 20 and processing the wafer in one pod 20.

[0020] The above-mentioned cassette delivery device 14 is arranged between cassette receipt room 13A of the right and left which are the dead space of the body 11 of equipment. Cassette installation object 14A in which this cassette delivery device 14 lays a pod 20 as shown in drawing 3, It has an attitude actuation \*\*\*\* drive (not shown) to cassette receipt room 13A of right and left of this cassette installation object 14. It is made to march out through a drive into cassette receipt room 13A of right and left of cassette installation object 14A, and the pod 20 is delivered between each cassette installation object 13C of the cassette receipt device 13. Moreover, the same positioning device as cassette installation object 13C of the cassette receipt device 13 is formed in the top face of cassette installation object 14A. Furthermore, when delivering a pod 20 between cassette installation object 13C in the cassette receipt room 13, this cassette installation object 14A is formed so that each cassette installation objects 14A and 13C may not interfere mutually. Therefore, the cassette delivery device 14 is automatically positioned by the position, when receiving the pod 20 conveyed by the wafer transport device 15, and it enables it to have handed over the pod 20 smoothly to the cassette receipt device 13.

[0021] Next, actuation is explained. For example, the case where a pod 20 is carried in to cassette receipt room 13A on the left-hand side of the semiconductor fabrication machines and equipment 10 shown by drawing 1 R> 1 is explained. In this case, the display lamp of the purport which should carry in a pod 20 to cassette receipt room 13A lights up to a control panel (not shown [ both ]), and evokes carrying in. Then, an operator gets to know the condition which can be carried in and operates the carbon button for cassette carrying-in actuation (not shown). If the cassette transport device 15 moves according to a rail 16 where a pod 20 is held, and it stops by attaching part 15A by this right above the cassette delivery device 14 of semiconductor fabrication machines and equipment 10, the attaching part 15A will descend and a pod 20 will be laid on cassette installation object 14A. At this time, a pod 20 is correctly positioned through a positioning device in the predetermined location on cassette installation object 14A. In parallel to this, the rise-and-fall controlling mechanism of the cassette receipt device 13 drives cassette installation object 13C, makes it go up and down cassette installation object 13C to a pod reception location, and stands by.

[0022] Subsequently, while door 13B of cassette receipt room 13A opens, cassette installation object 14A of the cassette delivery device 14 drives through a drive, marches out in cassette receipt room 13A, and stops in a pod turnover location. Then, while cassette installation object 13C goes up, passing through cassette installation object 14A, receiving a pod 20 and being positioned in a predetermined location, cassette installation object 14A retreats and returns to the initial valve position of the cassette delivery device 14. Furthermore, when carrying in the following pod 20, a pod 20 is carried in in the same procedure as the case where it mentions above. Thus, when carrying in two pods 20 continuously, that can be specified in a control panel. Moreover, a pod 20 is carried in in the same way also to the cassette receipt device 13 of another side.

[0023] Thus, processing of a wafer will be started if a pod 20 is carried in in semiconductor fabrication machines and equipment 10. At this time, the cassette receipt device 13 is driving, and one [ a gap or ] cassette installation object 13C goes up and down and stops to a wafer taking-out close location. Subsequently, after an opener's 19 driving and opening the lid 23 of a pod 20 wide, the handling arm of the junction room 17 driving, packing the wafer in a pod 20 the number of predetermined sheets and carrying in in the junction room 17, an opener 19 drives and a pod 20 is closed with a lid 23. If a wafer is carried in in the junction room 17, it will convey to each processing interior of a room via [ every one wafer ] load-lock-chamber 18, and predetermined processing will be performed at each processing room. After processing of each processing indoor and predetermined is completed, a wafer [ finishing / processing ] is returned in the junction room 17, and a wafer [ finishing / processing ] is further returned in a pod 20 through a handling arm. Then, the following pod 20 moves to a wafer taking-out close location, carries in the wafer in the junction room 17, and processes the wafer similarly. In the meantime, within cassette receipt room 13A, where the pod 20 by which the wafer [ finishing / processing of cassette installation object 13C ] was contained through the rise-and-fall controlling mechanism is laid, after going up and down and stopping to a cassette delivery location, the pod 20 is taken out to the side of cassette receipt room 13A through cassette installation object 14A of the cassette delivery device 14, and it conveys to a part predetermined by the wafer transport device 15 further. And the following pod 20 is conveyed through the wafer transport device 15 to right above the cassette delivery device 14 of semiconductor fabrication machines and

equipment 10, and it hands over to up to the cassette delivery device 14.

[0024] Since the cassette delivery device 14 was formed in the side of cassette receipt room 13A according to this operation gestalt as explained above, the dead space of semiconductor fabrication machines and equipment 10 can be utilized effectively, it is not necessary to provide the exclusive tooth space for cassette delivery for the front face of equipment (front face of a cassette receipt room) like before, and only the part can reduce the footprints of semiconductor fabrication machines and equipment 10. moreover, without suspending semiconductor fabrication machines and equipment 10 every, whenever it can carry out the continuous duty of the semiconductor fabrication machines and equipment 10 at the time of taking-out close [ of a pod 20 ] and carries out taking-out close [ of the pod 20 ] since the wafer which contained two pods 20 in the cassette receipt device 13, and was contained in each pod 20 can be processed continuously according to this operation gestalt, the operation effectiveness can be boiled markedly and can be raised.

[0025] The semiconductor fabrication machines and equipment 30 of other operation gestalten of this invention are explained referring to drawing 6. As shown in this drawing, the semiconductor fabrication machines and equipment 30 of this operation gestalt have been arranged in the front face of the body 31 of equipment, and this body 31 of equipment, and are equipped with the cassette taking-out close device 32. And the body 31 of equipment is equipped with the junction room 37 which has the taking-out inlet port of a wafer, the load lock chamber 38 connected with this junction room 37 through the gate valve, and two or more processing rooms which were connected with this load lock chamber 38 through the transfer room, and have been arranged in the shape of a cluster. In the junction room 37, handling arm 37A of the same multi-joint mold as the above-mentioned operation gestalt is arranged, and two or more wafers are held by handling arm 37A during processing of a wafer. And in the case of this operation gestalt, the taking-out inlet port of a wafer is formed at the side [ not the transverse plane of the junction room 37 but ] side. In addition, 37B is a gate valve.

[0026] The above-mentioned cassette taking-out close device 32 is equipped with the cassette receipt device 33 and the cassette delivery device 34 as shown in drawing 6. The cassette receipt device 33 is constituted according to the above-mentioned operation gestalt, counters with the taking-out inlet port of the junction room 37 of the body 31 of equipment, and is arranged. On the other hand, unlike the above-mentioned operation gestalt, the cassette delivery device 34 is made into the rotary system. That is, as it connects with revolving-shaft 34A which approached inside the front panel F outside a little, and was set up and this revolving-shaft 34A of an opener 39 in the corner of a end face, and it has cassette installation object 34B installed horizontally and revolving-shaft 34A shows by the arrow head through the rotation drive which is not illustrated, it has been made to carry out 90-degree forward inverse rotation of the cassette delivery device 34. And this cassette installation object 34B is formed in the shape of a ctenidium so that it may not interfere with this, even if cassette installation object 33C of the cassette receipt device 33 goes up and down, where the delivery location of the pod 20 in cassette receipt room 33A is arrived at. Therefore, also after cassette installation object 34B has arrived at the cassette delivery location in cassette receipt room 33A, cassette installation object 33C of the cassette receipt device 33 can be gone up and down without interfering with cassette installation object 34B, and can deliver a pod 20. Others are constituted according to the above-mentioned operation gestalt.

[0027] Therefore, with this operation gestalt, the taking-out inlet port of a wafer is established in the side of the junction room 37 which delivers a wafer. Since face to face is made to stand against this taking-out inlet port, the cassette taking-out close device 32 is arranged and the dead space of the front-face side (junction room side) of semiconductor-fabrication-machines-and-equipment 30 was utilized effectively. Cassette installation object 34B of the cassette delivery device 34 does not pass \*\*\*\*\*ing to the tooth space shown with the alternate long and short dash line of drawing 6 which the cassette taking-out close device of the above-mentioned operation gestalt occupies. Only by needing the tooth space which the cassette taking-out close device in the above-mentioned embodiment occupies at most, if it compares with the former, reduction of footprints is realizable like the above-mentioned operation gestalt. Moreover, since it has the cassette receipt device 33 which contains two pods 20 like the above-mentioned operation gestalt according to this operation gestalt, the operation effectiveness of semiconductor fabrication machines and equipment 30 can be raised.

[0028] Moreover, drawing 7 is drawing equivalent to drawing 6 which shows the operation gestalt of further others of this invention. As shown in this drawing in the case of the semiconductor fabrication machines and equipment 40 of this operation gestalt, the junction room 47 is divided into two rooms of the 1st and 2nd junction rooms 47C and 47D, and the 1st and 2nd junction rooms 47C and 47D are divided by gate valve 47B. And the inside of handling arm 47A of a multi-joint mold is arranged in 1st junction room 47C, and wafer maintenance device 47E which packs two or more wafers in 2nd junction room 47D, and is held up and down is arranged. Others are constituted according to the semiconductor fabrication machines and equipment 30 shown in drawing 6. Therefore, even if this operation gestalt sets, the same operation effectiveness as the semiconductor fabrication machines and equipment 30 of the operation

gestalt shown in drawing 6 can be expected.

[0029] Moreover, although not illustrated, the cassette taking-out close device of this invention may unify the cassette receipt device and cassette delivery device which are shown in drawing 6 and drawing 7. That is, the cassette installation object with which this cassette taking-out close device is constituted as a mere shaft, and the revolving shaft of drawing 6 and drawing 7 shows it to this shaft at drawing 6 and drawing 7 is connected with two steps of upper and lower sides. and each cassette installation object -- respectively -- a shaft -- minding -- 90-degree forward hard flow -- an individual exception -- pivotable -- and one ---like -- rise and fall -- it is constituted controllable. Therefore, when delivering a pod between wafer transport devices, one of cassette installation objects \*\*\*\*\*'s to the outside of the front panel by turns, when carrying out taking-out close [ of the wafer ] from a pod, where face to face is stood against the taking-out inlet port of a junction room, it goes up and down in one, and it is made to be located in the taking-out inlet port in each pod. In this case, a cassette taking-out close device becomes compact, and a cassette taking-out close device can be manufactured more by low cost.

[0030] In addition, although each above-mentioned operation gestalt explained the case where a pod 20 was directly delivered to a cassette delivery device through the wafer transport device 15, a wafer transport device is used only when conveying between the bays which consisted of each semiconductor-fabrication-machines-and-equipment group, and you may make it deliver a pod to each delivery device through AGV or an operator in each bay area. Moreover, although each above-mentioned operation gestalt explained the case where a wafer was conveyed using the pod which is a direct-vent-system cassette, it is not necessary to say that a wafer may be conveyed using an opening type cassette.

[0031]

[Effect of the Invention] According to invention of this invention according to claim 1 to 7, while footprints are reducible, the cassette taking-out close device and semiconductor fabrication machines and equipment which can raise operation effectiveness can be offered.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to semiconductor fabrication machines and equipment equipped with a cassette taking-out close device and this cassette taking-out close device.

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PRIOR ART

[Description of the Prior Art] The inclination which shifts to a 12 inches wafer at a stretch from a current semiconductor wafer (6 inches or 8 inches) (it calls the following and "being only a wafer".) has processing of the wafer in a semi-conductor production process. In connection with this, a carrying-out [ semiconductor fabrication machines and equipment ]-12 inch wafer correspondence thing is being developed. Since, as for the time of a 12 inch wafer, diameter [ of macrostomia ]-izing and the line breadth of the integrated circuit it not only weight-izes, but formed in a wafer only become [ a wafer ] the hyperfine structure below a subquarter micron, in each semi-conductor plant, the super-defecation technique of a clean room and the automatic conveyance-ized technique of a wafer become still more important. And since the footprint of various kinds of semiconductor fabrication machines and equipment increases, it becomes still more important to also control footprint increase of the circumference of semiconductor fabrication machines and equipment.

[0003] By the way, it was common to have leveled a wafer, when it conveyed a cassette where a wafer is stood when a 8 inches wafer conveys a wafer between each process, and it performed the taking-out close over the semiconductor fabrication machines and equipment of each process. The taking-out close into the equipment of a cassette is performed through an operator, or it is performing it through AGV. However, since the lower limit section of a wafer may be damaged in a self-weight, the vibration at the time of conveyance, etc. when it conveys standing a wafer in the case of a 12 inch wafer, where a wafer is leveled, a cassette is conveyed, and when performing the taking-out close over the semiconductor fabrication machines and equipment of each process, it is coming to carry out in the level condition as it is. And since it becomes difficult to perform the taking-out close into the equipment of a cassette through an operator from the weight and the cure against particle of a wafer, automation of these activities is promoted.

[0004] Moreover, after a 8 inch wafer made the cassette receipt room in which the cassette was laid a predetermined degree of vacuum, he was trying to transfer one wafer at a time to a predetermined processing room via a load lock chamber. However, while great time amount will be needed by the time it makes a cassette receipt room into a vacua since cassette capacity will become large if it becomes a 12 inch wafer, organic gas etc. may be emitted by vacuum suction as impurity gas from the cassette made from plastics, and the inside of equipment may be polluted. Therefore, in the case of the manufacturing installation corresponding to 12 inches, once arranging a junction room in the preceding paragraph of a load lock chamber and taking out the wafer in a cassette to the junction interior of a room, it comes to convey one wafer at a time to each processing room through a load lock chamber. Therefore, the thing corresponding to a 12 inch wafer also in the gestalt of a cassette is required. The pod (for example, uni-FAIDO pod) of the sealing method which now roughly divides as a cassette, for example, contains the cassette of an opening method and a cassette in a pod, and covers is considered.

[0005] By the way, it is constituted as shown in drawing 8 as the semiconductor fabrication machines and equipment of the present 12 inch correspondence under the above situations, especially its front end. These semiconductor fabrication machines and equipment 1 are equipped with the tray 2 which carries out taking-out close [ of 13 sheets or the pod P contained 25 sheets ] for a wafer to a cassette receipt room, the opener 3 which open and close the lid of the pod P on this tray 2, and the junction room 4 which takes out two or more wafers from the inside of the pod P wide opened by this opener 3 collectively. Moreover, although not illustrated, a load lock chamber is connected to the junction room 4 through a gate valve, and it has transferred one wafer in the junction room 4 at a time to the processing room of a wafer. Moreover, the front panel 5 is established in the front face of equipment, and the equipment and clean room side is divided by this front panel 5. The door 6 opened and closed in case it carries out taking-out close [ of the pod P ] to a cassette receipt room through a tray 2 is formed in this front panel 5.

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[Translation done.]

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EFFECT OF THE INVENTION

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[Effect of the Invention] According to invention of this invention according to claim 1 to 7, while footprints are  
reducible, the cassette taking-out close device and semiconductor fabrication machines and equipment which can raise  
operation effectiveness can be offered.

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[Translation done.]

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] however, in the case of the front end of the conventional semiconductor fabrication machines and equipment When carrying out taking-out close [ of the pod P ] to the cassette receipt room of semiconductor fabrication machines and equipment, in order to perform the taking-out close of Pod P through the tray 2 pulled out outside from the front panel 5, The exclusive tooth space for pulling out a tray 2 was needed, the footprint of semiconductor fabrication machines and equipment increased so much, and the technical problem that so excessive a tooth space was needed for the bay area formed by the equipment group of the same model occurred. Moreover, since only one piece carried out taking-out close [ of the pod P ] at a time through a tray 2 in the case of the conventional cassette receipt room, the technical problem that the processing cycle of a wafer is short, the count of taking-out close of Pod P increased, and the operation effectiveness of equipment itself was low occurred.

[0007] It aims at offering the cassette taking-out close device and semiconductor fabrication machines and equipment which can raise operation effectiveness while this invention was made in order to solve the above-mentioned technical problem, and it can reduce footprints.

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[Translation done.]

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## MEANS

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[Means for Solving the Problem] The cassette taking-out close device of this invention according to claim 1 is characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[0009] Moreover, the cassette taking-out close device of this invention according to claim 2 is characterized by equipping the above-mentioned cassette delivery device with the cassette installation object in which forward/backward moving is possible for the above-mentioned cassette to the above-mentioned cassette receipt device in invention according to claim 1.

[0010] Moreover, the cassette taking-out close device of this invention according to claim 3 The cassette receipt device which is arranged at the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing to a processed object, and contains two or more cassettes in the vertical direction, It has the cassette delivery device in which a cassette is delivered between this cassette receipt device. The above-mentioned cassette delivery device It is characterized by having been horizontally installed from the above-mentioned taking-out inlet port, the revolving shaft set up by one side between the above-mentioned cassette receipt devices, and this revolving shaft, and having the cassette installation object in which forward inverse rotation is possible through this revolving shaft.

[0011] moreover, the cassette taking-out close device of this invention according to claim 4 -- invention given in any 1 term of claim 1 - claim 3 -- setting -- the above-mentioned cassette receipt device -- the above-mentioned cassette -- laying -- and rise and fall -- it is characterized by having two or more controllable cassette installation objects.

[0012] Moreover, the cassette taking-out close device of this invention according to claim 5 The shaft which is the cassette taking-out close device which carries out taking-out close [ of the cassette ] to a processed object to the taking-out inlet port of the processed object in the semiconductor fabrication machines and equipment which perform predetermined processing, and was set up by the side of the above-mentioned taking-out close device, it crosses and connects with vertical two or more stages at a level with this shaft -- having -- respectively -- becoming independent -- forward hard flow -- pivotable -- and a shaft -- following -- one ---like -- rise and fall -- it is characterized by having two or more controllable cassette installation objects.

[0013] Moreover, the semiconductor fabrication machines and equipment of this invention according to claim 6 In semiconductor fabrication machines and equipment equipped with the cassette taking-out close device which carries out taking-out close [ of the cassette by which two or more processed objects were contained to the body of equipment ] the above-mentioned cassette taking-out close device It is characterized by having the cassette delivery device in which it is arranged in the side of the cassette receipt device which is arranged at the taking-out inlet port of a processed object, and contains two or more cassettes in the vertical direction, and this cassette receipt device, and a cassette is delivered between cassette receipt devices.

[0014] Moreover, the semiconductor fabrication machines and equipment of this invention according to claim 7 are characterized by the above-mentioned cassette taking-out close device unifying the above-mentioned cassette receipt device and the above-mentioned cassette delivery device in invention according to claim 6.

[0015]

[Embodiment of the Invention] Hereafter, this invention is explained based on the operation gestalt shown in drawing 1 - drawing 7 . The semiconductor fabrication machines and equipment 10 of this operation gestalt are equipped with the body 11 of equipment with which two or more processing rooms have been arranged in the shape of a cluster around a transfer room, and the cassette taking-out close device 12 which is arranged in the front face of this body 11 of

equipment, and carries out taking-out close [ of the wafer ] per cassette as shown in drawing 1 - drawing 3 . The cassette 20 which carries out taking-out close consists of cassette taking-out close devices 12 as a pod of the direct vent system formed with the synthetic resin with which a 12 inches wafer contains 13 sheets or 25-sheet receipt, such as a polycarbonate and PEEK (polyether ether ketone). Moreover, nitrogen gas is enclosed in a pod 20, and the interior is made into the clean environment while preventing the natural oxidation of a wafer as much as possible. So, below, a cassette 20 is explained as a pod 20.

[0016] Moreover, the cassette receipt device 13 of a Uichi Hidari pair which the above-mentioned cassette taking-out close device 12 is arranged at the taking-out inlet port of the wafer of the body 11 of equipment, and contains the pod 20 of plurality (for example, two pieces) in the vertical direction, It has the cassette delivery device 14 in which it is arranged between each cassette receipt device 13, and a pod 20 is delivered between the cassette receipt devices 13, and it is constituted so that drive control may be carried out according to a predetermined program. And it is contained in cassette receipt room 13A, respectively, opening which a pod 20 passes, respectively is formed in the side face by the side of the cassette delivery device 14 of each cassette receipt room 13A, and each cassette receipt device 13 has opened at the time of taking-out close [ of a pod 20 ] and closed door 13B of this opening.

[0017] Moreover, as shown in drawing 1 and drawing 3 , the cassette transport device 15 is arranged above the cassette delivery device 14, while this cassette transport device 15 moves between the bay areas of various kinds of semiconductor-fabrication-machines-and-equipment groups according to the rail 16 arranged by head lining of a clean room, it moves in the inside of a bay area, and the pod 20 is directly delivered between each cassette delivery device 14 of two or more semiconductor fabrication machines and equipment 10. Therefore, the cassette transport device 15 has grasping section 15A which descends from head lining through a wire etc. and grasps a pod 20, and has grasped the grasped section 22 formed in body 21 top face of a pod 20. Therefore, with this operation gestalt, the cassette transport device 15 has been made to perform all conveyances of a pod 20.

[0018] Moreover, as shown in drawing 4 , in the inner part of the above-mentioned cassette receipt room 13A, the junction room 17 is arranged through a clearance, and the load lock chamber 18 (refer to drawing 4 ) is connected with this junction room 17 through the gate valve. In this junction room 17, the handling arm (not shown) of a multi-joint mold is arranged, and while packing a wafer two or more sheets (for example, 13 sheets or 25 sheets) every and conveying it between a pod 20 and the junction room 17 through this handling arm, two or more wafers are horizontally held in the junction room 17. Moreover, a clearance is formed between cassette receipt room 13A and the junction room 17, and the opener 19 which opens and closes the lid 23 of a pod 20 is arranged in this clearance. As shown in drawing 5  $R > 5$ , when conveying Wafer W through a handling arm, the lid 23 of a pod 20 is opened [ this opener 19 ] and closed automatically in the wafer taking-out close location to the body 11 of equipment. Furthermore, the above-mentioned clearance is intercepted from cassette receipt room 13A and the outside, as the arrow head of drawing 4 shows, it supplies the air defecated by this clearance through the filter by downward flow, and it is changing the clearance into the always pure condition while it prevents a wafer from particle adhesion, even if it opens the lid 23 of a pod 20 wide with an opener 19. Furthermore, when it is attached in the opener 19 of the junction room 17, and the field which counters a gate valve (not shown) and carries out taking-out close [ of the wafer ], after opening a gate valve wide and carrying in a wafer, a gate valve is closed and the junction room 17 is sealed. therefore, the handling arm after opening the lid 23 of a pod 20 wide with an opener 19 -- minding -- a pod 20 to a wafer -- the inside of the junction room 17 -- carrying in -- holding -- this condition -- a wafer -- every one sheet -- taking out -- a funnel -- it conveys to various kinds of processing rooms through a lock chamber 19, and has been made to perform for example, etching processing, membrane formation processing, etc. in each processing interior of a room.

[0019] By the way, the above-mentioned cassette receipt device 13 is equipped with cassette installation object 13C of two steps of upper and lower sides, and the rise-and-fall controlling mechanism (not shown) which carries out rise-and-fall control of these cassette installation object 13C in one as shown in drawing 3 and drawing 4 , and it is made to have stopped each cassette installation object 13C according to the rise-and-fall controlling mechanism in the wafer taking-out close location. Furthermore, the cassette positioning device which is not illustrated is prepared in cassette installation object 13C, a pod 20 is positioned on cassette installation object 13C according to this positioning device, and it enables it to have opened and closed that lid 23. There is a thing constituted by having the crevice formed in the top face of cassette installation object 13C at the rear face of a pod 20 as this positioning device corresponding to the projections by which two or more formation was carried out, and these projections, for example, or a thing which made the projection and the crevice reverse, respectively. Moreover, cassette installation object 13C is constituted possible [ forward/backward moving ] to the direction of an opener 19, and when it stops through a rise-and-fall drive in a wafer taking-out close location, it is made to have advanced to the opener 19 side. Therefore, continuous running can be performed by the cassette receipt device 13, without being able to carry out taking-out close [ of other one pod 20 ], and

stopping semiconductor fabrication machines and equipment 10, while being able to contain two pods 20 and processing the wafer in one pod 20.

[0020] The above-mentioned cassette delivery device 14 is arranged between cassette receipt room 13A of the right and left which are the dead space of the body 11 of equipment. Cassette installation object 14A in which this cassette delivery device 14 lays a pod 20 as shown in drawing 3, It has an attitude actuation \*\*\*\* drive (not shown) to cassette receipt room 13A of right and left of this cassette installation object 14. It is made to march out through a drive into cassette receipt room 13A of right and left of cassette installation object 14A, and the pod 20 is delivered between each cassette installation object 13C of the cassette receipt device 13. Moreover, the same positioning device as cassette installation object 13C of the cassette receipt device 13 is formed in the top face of cassette installation object 14A. Furthermore, when delivering a pod 20 between cassette installation object 13C in the cassette receipt room 13, this cassette installation object 14A is formed so that each cassette installation objects 14A and 13C may not interfere mutually. Therefore, the cassette delivery device 14 is automatically positioned by the position, when receiving the pod 20 conveyed by the wafer transport device 15, and it enables it to have handed over the pod 20 smoothly to the cassette receipt device 13.

[0021] Next, actuation is explained. For example, the case where a pod 20 is carried in to cassette receipt room 13A on the left-hand side of the semiconductor fabrication machines and equipment 10 shown by drawing 1 R> 1 is explained. In this case, the display lamp of the purport which should carry in a pod 20 to cassette receipt room 13A lights up to a control panel (not shown [ both ]), and evokes carrying in. Then, an operator gets to know the condition which can be carried in and operates the carbon button for cassette carrying-in actuation (not shown). If the cassette transport device 15 moves according to a rail 16 where a pod 20 is held, and it stops by attaching part 15A by this right above the cassette delivery device 14 of semiconductor fabrication machines and equipment 10, the attaching part 15A will descend and a pod 20 will be laid on cassette installation object 14A. At this time, a pod 20 is correctly positioned through a positioning device in the predetermined location on cassette installation object 14A. In parallel to this, the rise-and-fall controlling mechanism of the cassette receipt device 13 drives cassette installation object 13C, makes it go up and down cassette installation object 13C to a pod reception location, and stands by.

[0022] Subsequently, while door 13B of cassette receipt room 13A opens, cassette installation object 14A of the cassette delivery device 14 drives through a drive, marches out in cassette receipt room 13A, and stops in a pod turnover location. Then, while cassette installation object 13C goes up, passing through cassette installation object 14A, receiving a pod 20 and being positioned in a predetermined location, cassette installation object 14A retreats and returns to the initial valve position of the cassette delivery device 14. Furthermore, when carrying in the following pod 20, a pod 20 is carried in in the same procedure as the case where it mentions above. Thus, when carrying in two pods 20 continuously, that can be specified in a control panel. Moreover, a pod 20 is carried in in the same way also to the cassette receipt device 13 of another side.

[0023] Thus, processing of a wafer will be started if a pod 20 is carried in in semiconductor fabrication machines and equipment 10. At this time, the cassette receipt device 13 is driving, and one [ a gap or ] cassette installation object 13C goes up and down and stops to a wafer taking-out close location. Subsequently, after an opener's 19 driving and opening the lid 23 of a pod 20 wide, the handling arm of the junction room 17 driving, packing the wafer in a pod 20 the number of predetermined sheets and carrying in in the junction room 17, an opener 19 drives and a pod 20 is closed with a lid 23. If a wafer is carried in in the junction room 17, it will convey to each processing interior of a room via [ every one wafer ] load-lock-chamber 18, and predetermined processing will be performed at each processing room. After processing of each processing indoor and predetermined is completed, a wafer [ finishing / processing ] is returned in the junction room 17, and a wafer [ finishing / processing ] is further returned in a pod 20 through a handling arm. Then, the following pod 20 moves to a wafer taking-out close location, carries in the wafer in the junction room 17, and processes the wafer similarly. In the meantime, within cassette receipt room 13A, where the pod 20 by which the wafer [ finishing / processing of cassette installation object 13C ] was contained through the rise-and-fall controlling mechanism is laid, after going up and down and stopping to a cassette delivery location, the pod 20 is taken out to the side of cassette receipt room 13A through cassette installation object 14A of the cassette delivery device 14, and it conveys to a part predetermined by the wafer transport device 15 further. And the following pod 20 is conveyed through the wafer transport device 15 to right above the cassette delivery device 14 of semiconductor fabrication machines and equipment 10, and it hands over to up to the cassette delivery device 14.

[0024] Since the cassette delivery device 14 was formed in the side of cassette receipt room 13A according to this operation gestalt as explained above, the dead space of semiconductor fabrication machines and equipment 10 can be utilized effectively, it is not necessary to provide the exclusive tooth space for cassette delivery for the front face of equipment (front face of a cassette receipt room) like before, and only the part can reduce the footprints of

semiconductor fabrication machines and equipment 10. moreover, without suspending semiconductor fabrication machines and equipment 10 every, whenever it can carry out the continuous duty of the semiconductor fabrication machines and equipment 10 at the time of taking-out close [ of a pod 20 ] and carries out taking-out close [ of the pod 20 ] since the wafer which contained two pods 20 in the cassette receipt device 13, and was contained in each pod 20 ... can be processed continuously according to this operation gestalt, the operation effectiveness can be boiled markedly and can be raised.

[0025] The semiconductor fabrication machines and equipment 30 of other operation gestalten of this invention are explained referring to drawing 6. As shown in this drawing, the semiconductor fabrication machines and equipment 30 of this operation gestalt have been arranged in the front face of the body 31 of equipment, and this body 31 of equipment, and are equipped with the cassette taking-out close device 32. And the body 31 of equipment is equipped with the junction room 37 which has the taking-out inlet port of a wafer, the load lock chamber 38 connected with this junction room 37 through the gate valve, and two or more processing rooms which were connected with this load lock chamber 38 through the transfer room, and have been arranged in the shape of a cluster. In the junction room 37, handling arm 37A of the same multi-joint mold as the above-mentioned operation gestalt is arranged, and two or more wafers are held by handling arm 37A during processing of a wafer. And in the case of this operation gestalt, the taking-out inlet port of a wafer is formed at the side [ not the transverse plane of the junction room 37 but ] side. In addition, 37B is a gate valve.

[0026] The above-mentioned cassette taking-out close device 32 is equipped with the cassette receipt device 33 and the cassette delivery device 34 as shown in drawing 6. The cassette receipt device 33 is constituted according to the above-mentioned operation gestalt, counters with the taking-out inlet port of the junction room 37 of the body 31 of equipment, and is arranged. On the other hand, unlike the above-mentioned operation gestalt, the cassette delivery device 34 is made into the rotary system. That is, as it connects with revolving-shaft 34A which approached inside the front panel F outside a little, and was set up and this revolving-shaft 34A of an opener 39 in the corner of a end face, and it has cassette installation object 34B installed horizontally and revolving-shaft 34A shows by the arrow head through the rotation drive which is not illustrated, it has been made to carry out 90-degree forward inverse rotation of the cassette delivery device 34. And this cassette installation object 34B is formed in the shape of a ctenidium so that it may not interfere with this, even if cassette installation object 33C of the cassette receipt device 33 goes up and down, where the delivery location of the pod 20 in cassette receipt room 33A is arrived at. Therefore, also after cassette installation object 34B has arrived at the cassette delivery location in cassette receipt room 33A, cassette installation object 33C of the cassette receipt device 33 can be gone up and down without interfering with cassette installation object 34B, and can deliver a pod 20. Others are constituted according to the above-mentioned operation gestalt.

[0027] Therefore, with this operation gestalt, the taking-out inlet port of a wafer is established in the side of the junction room 37 which delivers a wafer. Since face to face is made to stand against this taking-out inlet port, the cassette taking-out close device 32 is arranged and the dead space of the front-face side (junction room side) of semiconductor-fabrication-machines-and-equipment 30 was utilized effectively, Cassette installation object 34B of the cassette delivery device 34 does not pass \*\*\*\*\*ing to the tooth space shown with the alternate long and short dash line of drawing 6 which the cassette taking-out close device of the above-mentioned operation gestalt occupies. Only by needing the tooth space which the cassette taking-out close device in the above-mentioned embodiment occupies at most, if it compares with the former, reduction of footprints is realizable like the above-mentioned operation gestalt. Moreover, since it has the cassette receipt device 33 which contains two pods 20 like the above-mentioned operation gestalt according to this operation gestalt, the operation effectiveness of semiconductor fabrication machines and equipment 30 can be raised.

[0028] Moreover, drawing 7 is drawing equivalent to drawing 6 which shows the operation gestalt of further others of this invention. As shown in this drawing in the case of the semiconductor fabrication machines and equipment 40 of this operation gestalt, the junction room 47 is divided into two rooms of the 1st and 2nd junction rooms 47C and 47D, and the 1st and 2nd junction rooms 47C and 47D are divided by gate valve 47B. And the inside of handling arm 47A of a multi-joint mold is arranged in 1st junction room 47C, and wafer maintenance device 47E which packs two or more wafers in 2nd junction room 47D, and is held up and down is arranged. Others are constituted according to the semiconductor fabrication machines and equipment 30 shown in drawing 6. Therefore, even if this operation gestalt sets, the same operation effectiveness as the semiconductor fabrication machines and equipment 30 of the operation gestalt shown in drawing 6 can be expected.

[0029] Moreover, although not illustrated, the cassette taking-out close device of this invention may unify the cassette receipt device and cassette delivery device which are shown in drawing 6 and drawing 7. That is, the cassette installation object with which this cassette taking-out close device is constituted as a mere shaft, and the revolving shaft of drawing 6 and drawing 7 shows it to this shaft at drawing 6 and drawing 7 is connected with two steps of upper and

lower sides, and each cassette installation object -- respectively -- a shaft -- minding -- 90-degree forward hard flow -- an individual exception -- pivotable -- and one --like -- rise and fall -- it is constituted controllable. Therefore, when delivering a pod between wafer transport devices, one of cassette installation objects \*\*\*\*\*s to the outside of the front panel by turns, when carrying out taking-out close [ of the wafer ] from a pod, where face to face is stood against the taking-out inlet port of a junction room, it goes up and down in one, and it is made to be located in the taking-out inlet port in each pod. In this case, a cassette taking-out close device becomes compact, and a cassette taking-out close device can be manufactured more by low cost.

[0030] In addition, although each above-mentioned operation gestalt explained the case where a pod 20 was directly delivered to a cassette delivery device through the wafer transport device 15, a wafer transport device is used only when conveying between the bays which consisted of each semiconductor-fabrication-machines-and-equipment group, and you may make it deliver a pod to each delivery device through AGV or an operator in each bay area. Moreover, although each above-mentioned operation gestalt explained the case where a wafer was conveyed using the pod which is a direct-vent-system cassette, it is not necessary to say that a wafer may be conveyed using an opening type cassette.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the front end of the semiconductor fabrication machines and equipment of this invention which applied 1 operation gestalt of the cassette taking-out close device of this invention.

[Drawing 2] It is the top view showing the important section of the cassette taking-out close device of the semiconductor fabrication machines and equipment shown in drawing 1.

[Drawing 3] It is the front view showing the important section of the cassette taking-out close device shown in drawing 2.

[Drawing 4] It is the side elevation of the semiconductor fabrication machines and equipment shown in drawing 1.

[Drawing 5] It is the perspective view showing the condition of opening the lid of a pod with the opener shown in drawing 2.

[Drawing 6] It is a top view equivalent to drawing 2 which shows other operation gestalten of the cassette taking-out close device of this invention.

[Drawing 7] It is a top view equivalent to drawing 2 which shows the operation gestalt of further others of the cassette taking-out close device of this invention.

[Drawing 8] It is the top view showing the front end of the semiconductor fabrication machines and equipment with which the conventional cassette taking-out close device was applied.

### [Description of Notations]

10, 30, 40 Semiconductor fabrication machines and equipment

11, 31, 41 Body of equipment

12, 32, 42 Cassette taking-out close device

13, 33, 43 Cassette receipt device

13C, 33C Cassette installation object

14, 34, 44 Cassette delivery device

14A, 34B Cassette installation object

34A Revolving shaft

20 Pod (Cassette)

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[Translation done.]

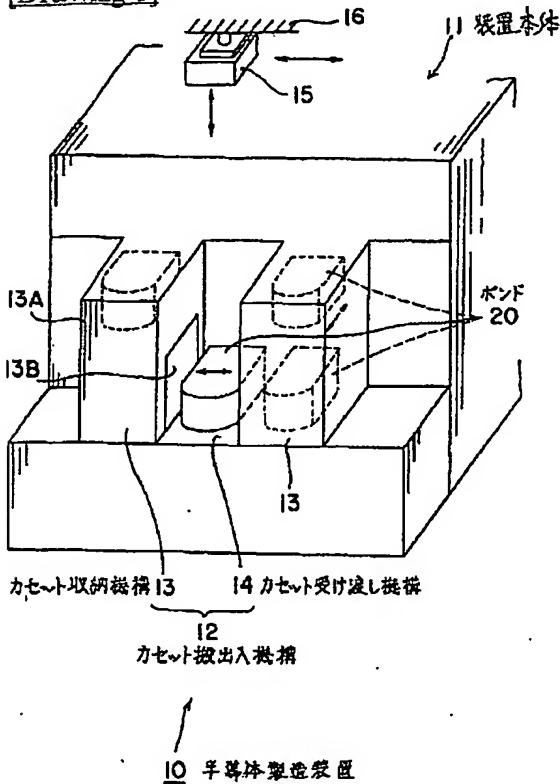
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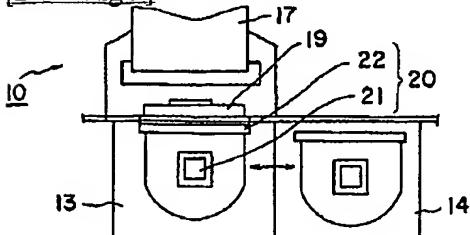
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## DRAWINGS

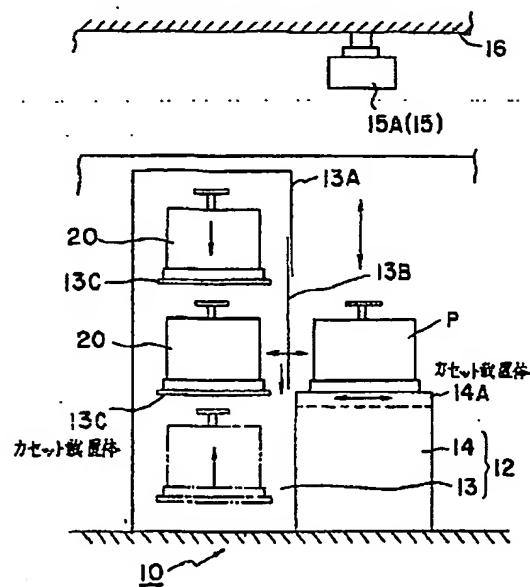
## [Drawing 1]



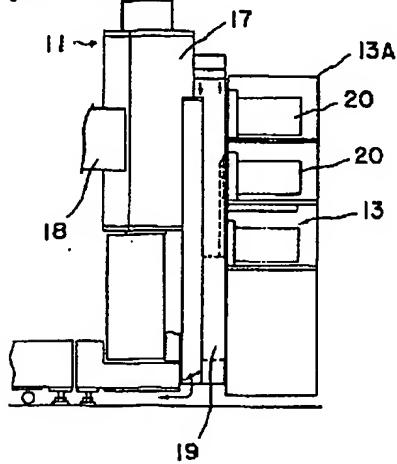
## [Drawing 2]



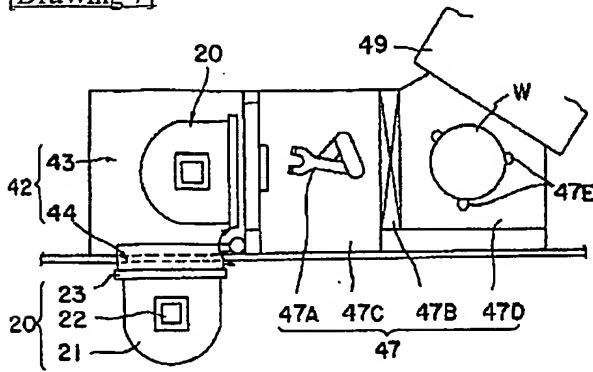
## [Drawing 3]



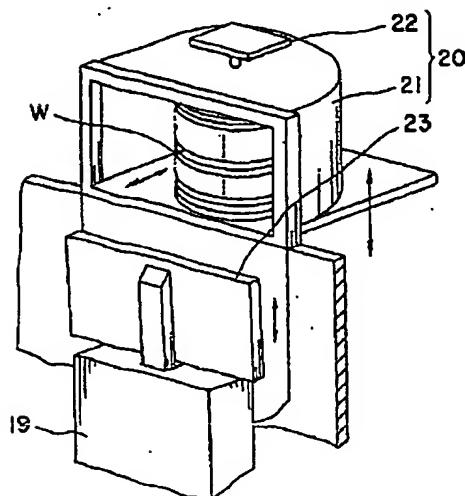
[Drawing 4]



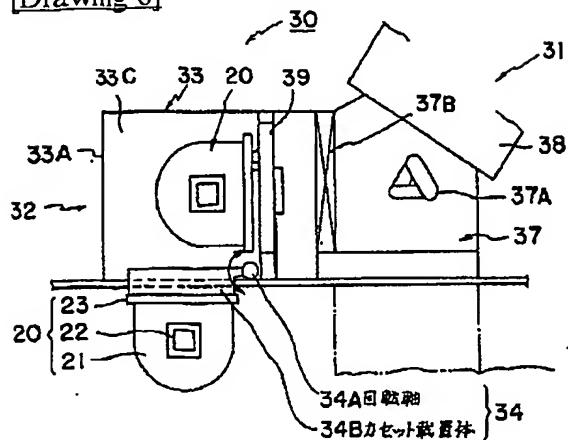
[Drawing 7]



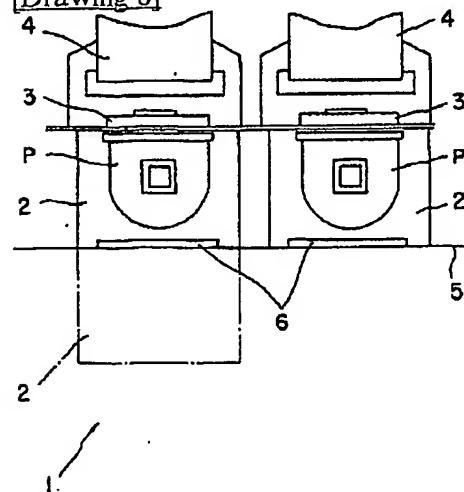
[Drawing 5]



[Drawing 6]



[Drawing 8]



[Translation done.]